PyroTechnics

THE NOW & THEN NEWSLETTER OF
GENERAL TECHNICS

PERPETRATED LARGELY BY
JEFF DUNTEMANN
& CAROL DUNTEMANN

GENERAL
TECHNICS

NO. 10 OCTOBER 1977

CALCULATORS

Perhaps the greatest failure of imagination of the SF community was their inability to foresee the pocket calculator. We all fondly remember the tales from the 40's and 50's, in which the 26th century engineers reach for their bamboo (well, maybe synthaboo; progress, after all...) slipsticks to calculate hyperspace entry points. And this morning I held an HP25 programmable in my hand and wondered what Doc Smith would make of it. (He'd probably ask how they ever made relays that small. Sigh.)

The very rare story that dealt with miniature calculating devices usually assumed they were radio-linked terminals to some large central computer which did all the work. Asimov's remarkable little story "A Feeling of Power" had electro-mechanical handheld terminals. (Mechanical because of little wheels with numbers on their edges so that digits could be displayed.) Never once did anyone really suspect that computing machinery could itself be reduced so far in size while being expanded so vastly in capability. While calculator shopping today I handled one little number that measured one inch by two, and found that my fingertips had a tough time pushing the right button. We could make a calculator scaled for hamsters if hamsters could calculate; the limits of size lie not in technology but in the clumsiness of human fingers.

I saw another calculator this morning which made me smile nostalgically. I was one SF reader who, in pre-IC days, never bought this synthaboo slipstick shit. I know the sliderule, used it heavily in high school, and hated every second of it. At best three significant figures and no decimal points--arrgh! I knew science would someday do away with it. So, when I started writing serious SF in 1967, I postulated an "electronic slide rule" as a narrow stick about ten inches long, having a number of flat rectangular keys much like a piano, plus a little number window where figures would appear in a matrix of tiny grain-of-wheat bulbs. It hung on your belt, as a proper slide rule should do, and I set a perfection date of 2650 on it. Imagine my surprise today to pick up the Canon Ruler 8, and see my idea made flesh: a golden metal 8"ruler containing a four-banger memory calculator with liquid crystal display. Save for the size and the shape of the keys, it looked a great deal as I had longed for it ten years before. It will never hang on a starship engineer's belt--though it will probably sit unusued on bored executives' desks for years to come before the next consumer gadget fad breaks.

Back to SF. "A Feeling of Power" was concerned with people forgetting how to manipulate figures manually once pocket calculator-terminals became universal. This is a real concern, and an astonishing bit of insight for its time. Will tomorrow's children, when asked how they know that the square root of 4 is 2, answer that their calculator told them?

They probably will. But will that be such a new disaster? No. I learned how to extract roots manually in 1968, and completely forgot the process, also in 1968. When I needed roots I reached for my slipstick--or for ten significant figures dug out my math tables. Today I couldn't take an accurate root of a non-perfect square to save my life. But I learned addition and subtraction in the fifties, when even computers were new;how will a calculator-weaned student look upon arithmetic in general?

People who work with computer languages will affirm that you tend to think in terms of your favorite language after awhile; you set up problems, in other words, in the form required to compile them in Fortran or APL or PL1. What may well happen in schools of the future is that children will no longer add apples and oranges (capital sin #3 in Catholic schools of the fifties--after Losing The Place and Impure Thoughts) or envision number lines as infinitely extensible rulers. They will perhaps think of that bushel of oranges as a variable awaiting assignment of a value, of number lines as infinite loops, or later, of analytic geometry as an application of computer graphics instead of vise-versa.

We may in fact lose nothing, and gain much. A "number" is a subtle sort of abstraction, and to be taught to children it must be cloaked in metaphor--be it apples and oranges or buttons on their Mickey Math. We are no longer an agrarian society. Our lives are no longer intimitely involved with bushels and furlongs and the parlance of traditional arithmetic education. Strictly average students may well think of numbers and arithmetic functions as colored buttons on their calculators. The brighter students will look beyond the plastic and think of numbers as conducting states in tiny memory cells. That isn't quite correct, either...but it beats the hell out of arithmetic as I learned it.

Yes, Davey, us old-timers did make numbers by rubbing two sticks together. Now shove over and let me take a look at that PASCAL routine...

QUARKS

Tullio Proni, master of rayguns and maker of robots, dropped a gallon jug full of pennies on his foot and broke his big toe. Some people just have no cents.

It is now quite thoroughly official: your editor and editrix will be remaining in Chicago until December 1978, at the very least. Xerox will be field testing the new 5400 copier here, and where the field tests go, we go. So stop those rumors, Alice; we are not in Houston, Miami, or New York. We are right here on Albany Street, cranking out PyroTechnics and preparing for another (groan) Chicago winter.

GENERAL TECHNICS is an organization of fannish techies (and not techish fannies, as some wiseass reported) who share data, resources, and experienc in pursuit of a good time and occasional profit. The group meets mainly at cons, hamfests, and private Berserker Weekends.

MEMBERSHIP is terribly difficult to obtain. You must somehow scrape up a number of 13¢ stamps, and then at great effort write a letter explaining what your qualifications as a techie are to

Jeff Duntemann
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including those stamps. If the above person can read your handwriting you are an

APPRENTICE TECHIE and entitled to call yourself a member of General Technics. You will also receive

PYROTECHNICS until your stamps run out. Renewal of membership is synonymous with sending more stamps. If you decide to quit, we will use one of your stamps to send the rest back to you. If you're nuts enough to want to become a

SECRET MASTER UV TECHNOLOGY (SMUT) you had better talk to

Tullio Proni
1309 Wells Place
Kalamazoo Michigan, 49001

because I don't have anything to do with it.

ANYTHING ELSE, ask me. I may not know but I'll tell you anyway.

I wuld greatly appreciate it if all you thumbers of computer magazines would keep an eye open for articles or software or anything at all printed about the RCA COSMAC microprocessor, also known as the CDP1802. If you see something, drop me a note as to where to find it, or run off a copy if you can get cheap copies somewhere. The 1802 is COSMO Klein's brain, and the more I can learn about his brain, the smarter COSMO will turn out to be. I _especially_ would like to see the user manual to the new RCA VIP hobbyist computer, as it contains a number of video graphics routines. If you see this manual on sale at a computer store or somewhere, buy it _instantly_. Fast and gracious reimbursement will be made.

Many of you may well have run into my sister at one con or another without knowing we were related; at least one person, however, mistook her for my wife. She has asked me to prod you people to suggest a few hard SF costume ideas for her costume at Iguanacon. She shares my view that the worldcon costume show leans too much to vast flowing fantasy numbers, with very little literal depiction of science fiction characters attempted. She and her group had an excellent costume at MAC: the crew of the _Lying Bastard_ from Niven's _Ringworld_. It was rudely ignored by the judges, who didn't even run it through a second time. (Every one of those judges deserves to have their noses used to grind rock salt--recall the ugly woman in a shower curtain who won with some drivel about Mary O'Meara.) If you can think of a good costume idea-- no matter how far out--send it to Gretchen Duntemann, 809 Edgebrook #102, DeKalb IL 60115.

Whatever happened to electric trash compactors? I was just wondering.

George Ewing, WA8WTE, has a story in the latest IASFM, called QRP, about some _mighty_ low power radio communications. Don't miss it. The cover has a pterodactyl about to nibble on a hot air baloon.

Your editor also had a story recently appear in the semipro edition of _Tessaract Science Fiction_. It's called "The Fantastic Tower of Timothy Trellion," and I'm not certain I have the nerve to tell you what it's about.

This issue of _Pyro_ will probably be the last one for 1977. On October 24 I will be heading out to Leesburg, Virginia, to attend classes on the 5400 copier. That will keep me busy (and away from home) until the middle of December. I will probably surface for Chambananacon, but it looks like it's going to be a lean fall. I do expect to completely re-wire wrap my COSMAC processor board, incorporating 2K RAM, 2K EPROM, a UART and a software operated TouchTone encoder. That's about all there is to do out there, aside from hunting the legendary Leesburg wood ticks. I would greatly appreciate mail, and the address is:
Xerox International Center for Training & Management Development PO Box 2000 Leesburg VA 22075

>QUARKS CURRENT AS OF 10/14/77 1138HRS

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TECHIE TALKIES

It's been so long since we've even mentioned Techie Talkies that I'll bet most of the membership has never heard of them. We toyed with the idea early in 1976 as a private, home-made communications system among GT members when they gather at cons or other GT functions. I built a receiver which worked well as a receiver, but since it was a superregenerative circuit, the quench frequency gave my wife headaches and made all the cockroaches in my old apartment commit hari-kari. I did pick up the paging signals from a nearby hospital very well, and on the other end of the scale I could tune in channel 2's video. (Sounds like a 60 cycle hum with a lisp, but it's commercial television's most noble form: raw video. Do anything dumb like demodulate it and you turn it instantly to raw shit.)

However, I could never get a transmitter to function even minimally, and realized I was spending a lot more time and money on the project than I could justify. I shelved it until further developments. We had brief hope when Rod Smith heard word of the Lithic LP2700 single-chip transceiver, but then Lithic went broke and the chip masks fled the country.

Now I offer another hope, because the TT network is one helluva nifty concept, and might serve to interest a few of you people in radio. There are commercially available transmitter and receiver modules, offered basically as circuit boards plus instructions and a boxful of parts. Put a transmitter board and a receiver board in a box with speaker and battery, and you've got a basic Techie Talkie. From there we add TouchTone encoders and decoders and whatever else we like.

This system would be a damned sight better than using a rushbox with a 2 transistor AM transmitter. These modules are FM, with a crystal filter, and can use a short, flexible "rubber duckie" antenna. In short, _quality._ The only possible catch would be the price. A little quick figuring lets me estimate a price of 85 bucks for a good TT. I'm researching the details right now. In the meantime, I want to know: Is it worth it to you? It is to me. Let me know what you think.

* * *

ON THE BEAM

BY JEFF TOLLIVER

One of the biggest problems with the Joe 'droids is the remote control technique. Using CB frequencies can be a bummer--especially if Uncle Charlie catches you at it.

(Editor's Note: I hate to take the edge off Jeff's warning--since the following article is superb--but the chances of the FCC even detecting Joe's remote control signals is somewhat remote. All of Joe's remote-control transmitters thus far have been unmodified type-accepted "licenseless" walkie-squalkies covered by the FCC's Part 15 rules'N'Regs. These devices have a DC input limited to 100 milliwatts, which, figuring a typical 35% loss in the RF final, comes out the antenna sounding like 60 to 65 milliwatts. Joe's remote-control range, by actual test, was found to be something less than two hundred feet. We expect the signals can be heard a little farther than that, but not much. Furthermore, the FCC never issues a citation unless a complaint has been received from someone who has experienced interference from a questionable RF source. Technically it can, but with a million CB licenses on its desk and hundreds of thousands pouring in every month, it ain't likely. Anyway, holding kiddie talkies to the letter of the law is about 10,659 on the FCC's list of priorities. With the FCC unaable to remove 100,000 illegal 1000 watt pirate stations from the band, I don't think we need worry too soon.)

A better reason to investigate alternate control methods is that of interference. Right now, a heterodyne from other users on the control channel makes Joe do a most undignified mechanical mazurka even ten feet from the control box--and that can be embarrassing to supposedly omnipotent techies. CB is crowded and unruly as hell--which is reason enough to get off it. Where we go from there is another question. Light is one place--though there are problems--but a better notion might be to show up quietly on some other part of the radio spectrum and just not talk about it. I've been into radio for many years. It can be done. You just have to be discreet and stay away from legit users. If you think there's no room to go, ask me to give you a tour of our crowded--snicker--radio spectrum. ////Thanks, Jeff. Let me get off the soapbox and hand it back to you--Ed.)

We could opt for RC channel controls using freq's that the remote-control boat and plane builders use. However, this is not a very original or innovative method. And those damned crystals cost!

How about rigging an FM pulse transmitter using infrared LEDs in the control box and phototransistor pickups in the receiver section? This would closely resemble the wireless IR headphones that hit the market awhile back. (Anybody got the dope on those thingies?) (Send it to me right away!!!--Ed.)

I think Forry Mims has something on a transceiver using IR diodes/pickups. I'll have to cross reference to check it out. (Editor's note: Check in Forry's book Optoelectronics Projects, printed by Radio Shack. He also has a book on LEDs published by Sams, and does a monthly experimenters' column for PE. I'm seeing him just about everywhere these days, and LED projects of this sort are a big favorite with him. September PE has a whole column devoted to laser diodes. It's worth checking out.--Ed.)

Okay, say it's rigged up. ("It's rigged up.")

What are our limitations? (Mainly money, booze, and dope.)

(1) Line of sight communications. Light just doesn't turn corners. (On the other hand, a 100 mw Space Patrol walkie talkie ain't all that hot either, but that's EM, not IR.) So we'd have to limit our activities to relatively open areas, like the Mojave Desert. (Indeed. One can think of the Mojave as a 200 mile IR light panel. Like sitting atop the Voice of America broadcast array with Joe's 60 mw control box. What was that about an ant and a rubber tree plant?--Ed.)

(2) Distance Attenuation, i.e. 1/D2 = power received. This would hold true if we used a standard point source IR radiator and broadcast in a 360 degree wavefront. By using a reflector and/or lens on both controll and 'droid our distance factor would be improved considerably. Maybe to double present range.

(3) Interference. Probably the most irritating bugger factor in radio control using tone generators is the clown who decides to whistle into his mike--with his "signal" drowning yours out totally. Ain't no such critter on IR 'cause ain't all that many IR transmitters running around loose. Least, not yet. (However, a sparkler or roman candle's a real noise maker.)

(4) Signal reflection. Negligable with EM but a somewhat curious effect with IR. If you set up in a fancy place full of mirrors you'd probably drive the 'droid to drink...but that's just a wild guess. (Anyone for a wild guess chase?)

A rig for the transmitter would be a cluster of IR diodes in a parallel or slightly divergent array. A redundant setup would preclude any breakdowns but would increase cost.

Collimating lenses could cut divergence on the beam by a considerable factor. These, focused correctly, would afford a simple "aim and control" effect. A cluster of phototransistors, in the receiver half of the rig, would pick up the signal and pass it on accordingly. (Sounds like a quarterback sneak to me.)

This cluster should be circular, with all lenses pointing outward and with sufficient overlap of fields to cover all angles. This would eliminate the need to "beam" a certain spot on the 'droid in order to control. A hemispheric cluster would be optimum, but again, performance fights cost and loses. (Winnah and still champeen--The Tight Budget!) Using two arrays you could transmit two simultaneous commands. (Of course this requires a suitable band pass filter for both freq's plus duplicate recording systems, but...) (You design it, Jeff, and by God, we'll use it--Ed.)

I wonder how far a modulated IR/CO2 laser could control this turkey? Infinity or the horizon, or whichever comes first? (Useful for robots with orbital insertion capabilities; now, someone just has to design that--Ed.)

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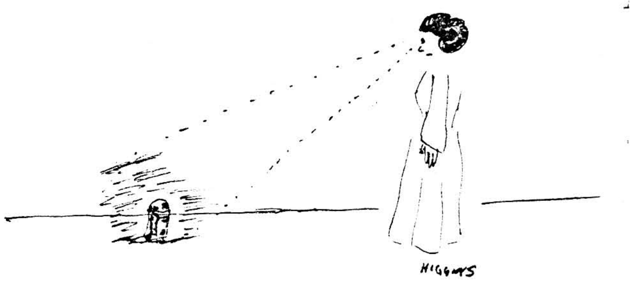

A.T.M.

Way back when I had just turned 13, I inherited an old broken-down slide projector from my grandparents. It was old, but had been an excellent make, and I found some mighty fine lenses inside. They were large projection lenses, of thick glass, without a chip or a scratch anywhere. Among the junk that kids always collect (and proto-techies much more than most) I had a couple of little lenses, no more than half an inch in diameter. They had olive-drab rims, and had probably been pried out of some sort of gunsight during the war.

Quick to synthesize, I got some toilet-paper tubes, loose cardboard, tape, and Elmers Glue, and I built my first telescope. It was nothing more than a 2" projection lens up front with one of the little gunsight lenses as an eyepiece. They were mounted on lopsided tubes that slid more or less one into the other to give an approximate kind of focus. Still, when I aimed that clunker at the full moon, my mouth dropped wide open. No matter that the moon was surrounded by a little rainbow, or that I could hardly hold it still enough to see clearly. By my young hands I had pulled the moon halfway to Earth.

It was pretty crude, but not nearly so bad as it might have been had I used inferior lenses. And by then I was caught. I had to have a "real" telescope. And I was going to build it myself.

I enrolled in the Adler Planetarium's telescope mirror- making course. If you've ever been to the Adler, you might have seen the optical shop in the basement, where people bend over 55 gallon oil drums, rubbing pieces of glass together. Those are telescope techies. They are a breed all their own, and I am glad to be among them. I learned a great deal.

I purchased a mirror-making kit from a friend who had attempted a mirror and found his patience not equal to the task. I soon found that it does take patience, and plenty of perseverence, to produce a good optical surface. It took me ten months. Let me tell you how it works.

You start with two glass disks, one usually Pyrex, the other green plate glass. The green plate disk is mounted between three cleats on top of a heavy pillar. Oil drums are nice, but for my at-home work I used an old wringer washing machine full of power transformers to good effect. You dribble some water on the green plate, sprinkle it with 80 grit carborundum from a saltshaker, and then start scraping the Pyrex disk over the green plate disk. The center of the Pyrex disk bears over the edge of the green plate, and every dozen scrapes you take a short step around the pillar in one direction, and rotate the Pyrex disk a few degrees in the opposite direction. (Walking around the pillar has the same net effect as rotating the green plate disk.). In time (much time) the center of the Pyrex disk and the edge of the green plate disk begin to wear down.

This went on for ten or fifteen hours total time, spread out (for me) through a period of two months. I suppose I didn't work that hard at it, since if I had I probably would have gotten sick of it. As grinding progresses, you gradually switch to finer and finer corborundum, and bring the center of the pyrex disk away from the edge of the green plate disk and closer to its center. When grinding is finished, you should be moving the disks center-over-center, have the corborundum grade down to #600 or finer, (with no pits or scratches in the glass larger than a grain of #600 carbo would make) and the curve in the pyrex disk should be very nearly a perfect sphere.

The usual question, of course, is how you can get anything like a true, accurate optical surface out of such poorly-controlled, brute-force methods. The fact is that it happens automatically. A stroke which is exactly one third the diameter of the pyrex disk long will produce a perfect spherical curve if continued long enough. How do you produce a perfect one-third stroke? By being sloppy! Any telescope techie will tell you with a sigh that, yes, there are thousands of strokes involved when you grind a telescope mirror. Because they are done by human hands those strokes are all a little different, some shorter, some longer than one third the mirror diameter, even though the telescope techie knows very well what one third his mirror diameter is and keeps his strokes close to it. Similarly, the steps around the pillar and the increments of rotating the pyrex disk are all a little different. But when you average those thousands upon thousands of little movements, the random variations cancel out, and you end up with a stroke which is a mighty close approximation of the magic one third mirror diameter.

In fact, had you been too exacting in making your mirror, constantly fretting and jerking and deliberately compensating for what you perceive to be variations away from a one-third stroke, you would probably have introduced regular quirks of motion that would have built up over a few thousands strokes into a severely irregular optical surface.

This modus operandi is a weird one. If you are too consciously precise, you will make a poor mirror. If you relax, daydream, be a little sloppy, and generally randomize the corners of your movements, your errors will cancel out and your mirror will be essentially perfect. By using this technique, I produced a ten inch diameter mirror which upon first testing proved accurate to within one tenth wavelength of yellow light. A couple millionths of an inch. This by a fourteen year old kid who hadn't the slightest idea what he was doing.

This isn't the whole story, of course. After being ground the mirror must be polished, which is done by pouring optical pitch onto the green plate disk, cutting polishing facets into the pitch, and rubbing the mirror over the pitch using barnesite polishing compound in water as a lubricant. The randomizing law holds even truer for polishing, since the action is slower and there are more strokes to average out. In the very end you break the law by introducing--very carefully--a highly specific regular action which gradually deepens the spherical surface into the optically superior parabola. Doing this without screwing up the mirror ten other different ways is the real art of mirror making.

The finished, polished mirror is given a reflective coating a few aangstroms thick by bombarding it with aluminum atoms in a good vacuum. The planetarium did this for me; the equipment required is pretty formidable. But once done, it's done, and the transparent aluminum oxide which forms over the aluminum serves to protect it from scratches and chemical contamination.

I first housed the mirror in a square plywood tube, mounted on a stand of 2" pipe fittings, the bearing surfaces being the threads of the pipes themselves. It was cheap, scroungeable, and needed very few tools. It enabled me to see galaxies, globular clusters, and planetary detail whose beauty is difficult to describe. I improved the mounting over the years, but there came a point beyond which further improvement was impossible without wholesale access to machine tools. My hand-tool-made mountings were never accurate enough to fully exploit the accuracy of the mirror I had made by hand, just by being sloppy and not worrying too much about perfection. Funny how that works.

I will go back to telescopes someday, when I have the bread to buy a lathe and perhaps a vertical mill. In the meantime, I would like to put in an absentee plug for a branch of techie-dom which kept me busy for quite a few years. Check out Sky and Telescope magazine, or the several books on home made telescopes which planetariums and large bookstores sell. Some of the best material on home made scopes was collected into Homebuilt Telescopes, a book published by Edmund Scientific and sold through them. It's like those little Radio Shack project books by Forry Mims; the parts list is a page right out of the Edmund catalog, but the material is excellent. Give it a try. You will seldom make anything so accurately with so little attention to detail. And your first view of the great globular cluster M13 exploding into resolved stardust will make you a telescope believer forever.

-JD

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THE PRINCE OF WAILS

BY TODD JOHNSON

Ever find yourself in need of a good warble generator to dress up your latest energy weapon or to scare the neighbors? Usually one would turn to the standard "quick-and-dirty" solution using 2 555's:

This type of circuit is fine for most applications but good ol' pin 5 just doesn't have it when it comes to modulation depth or input impedence. Here's a VCO that can be modulated from full off to above audio range with a three volt change on the control input, with an input impedence of ten megs. The FET I used pinches off at -3 volts, so if you use a 9 volt battery the control voltage is effective from 6 to 9 volts.

Since the input resistance is so high, a variety of input signals can be used which were cumbersome or impossible before. You say you don't like the sound of triangle wave modulation? How about sawtooth? Let's go back to the first circuit with the 2 555's, only this time insert the FET VCO for the second 555, and make the input a sawtooth. The circuit now generates a satisfying upward sweeping tone. Choose component values to fit your application.

IT MAY OR MAY NOT COME IN THE MAIL

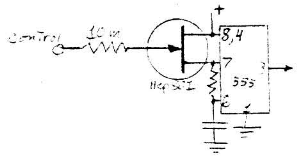
-THOUGHTS ON PARTS

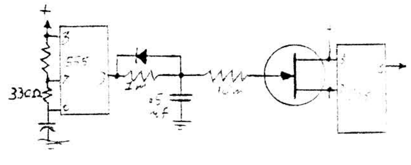
Last Pyro Paul Baumann asked about Allied Radio as a dealership. In the old days, when I was first getting into electronics (1964 or thereabouts) Allied was a terrific place, stocked almost everything, and delivered in five days. Then Radio Shack swallowed them up, and now there isn't much left. Allied now sells a rather slim catalog for a buck, has a 20 dollar minimum order, and charges 75 cents for a 7400. Other prices are utterly unreal. Their quantity price break indicates that they don't want the little guy's business unless he's willing to pay with his shirt and right arm. I strongly recommend giving them the finger unless you're really desperate for some of the odd stuff they carry.

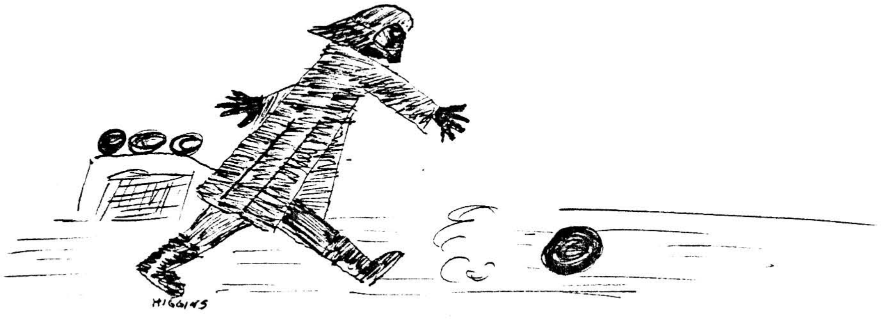
Advanced Microcomputer Products has changed their name to Advanced Computer Products, and have just put out their first big catalog. I have dealt with them a number of times now, and they have only goofed up one order. They sent me ten 18 pin sockets instead of 22 pin sockets, but they replaced the sockets in near record time. Their catalog is good, and although they've upped some of their prices a few cents over the magazine trailer ads, they have what may be the widest selection of microcomputer-type parts that I've ever seen. Prices on IC sockets are very good; I get all my sockets there.

Todd Johnson tells me of a parts purchase his company made, of a number of high-quality write-only-memories (WOM's.) His WOM's, having a little quartz window, are obviously EWOM's (Enlightenable Write Only Memories). The reason he can tell is that under the quartz window there is absolutely no chip whatsoever. Just a neat little empty space surrounded by 24 gold-plated contact pads. New era of simplicity in integrated circuits!

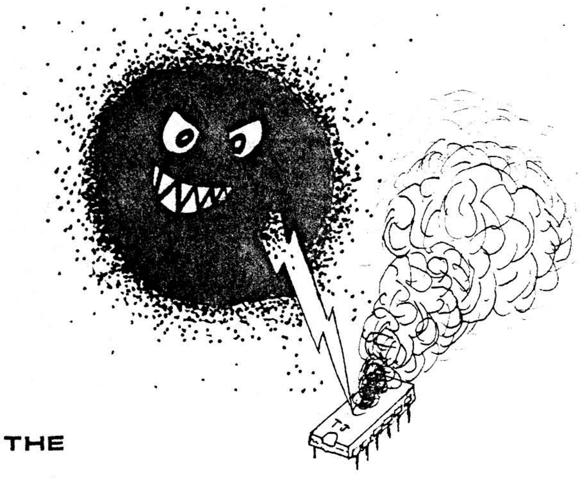
* * *







DARTH VADER APPEARS ON
"CELEBRITY BOWLING"



THE GLITCH GATE STRIKES !

BY AL DUESTER & TODD JOHNSON

Hail to ye all, fellow electron pushers, computer jocks and jockettes, and perpetrators of techish deeds. Once again the Glitch Gate materializes to swallow whatever is on hand.

Today's dissertation is partially on the 137th annual Loganberry Festival, otherwise known as Windycon 4. The con started off on a good note, that being that as we pulled into the parking lot, lo and behold, there appeared unto mine eyes, the magic incantation "TEKTRONIX" printed upon the side of a large vehicular transport. Closer inspection revealed the insides to be lined with a myriad of test equipment of all description. Unfortunately, I could not find the personnel related to this behemoth to get permission to perform a biopsy. Oh, well.

Normal con malfunctions started immediately thereafter. New gadgets to be found included my 7 x 7 LED matrix necklace, Clyde's gun with leventy-leven LED's in the front behind a lens, and definitely Mark Hyde's light sabers. I was introduced to these when I cam across two young (circa 1968) kids battling it out in a corner of the con suite, to the accompaniment of some kazoos. Ya gotta admit, it's a helluva lot cheaper than an inertial controlled hum generator! Quite spectacular looking in the dark, they lost some of their effect when the lights were turned on to reveal that they were golf club protectors taped onto colored flashlights. Tullio didn't have any sabers with him, explaining that he couldn't keep up with the demand. He did have his usual assortment.

Saturday, a group of us decided to take Jeff up on his offer of hitting the nearby surplus outlet. Unfortunately, the owner had gone on vacation over the con weekend. Leaving some torn hair on the scene, we went to the liquor store to stock up for the GT party that night. We only picked up four cases of beer and pop each, and two large boxes of potato chips. Naturally we couldn't exactly carry these past the front desk. The closest entrance was, once again, you guessed it, a fire door maked "NO ADMITTANCE" on the outside. It didn't state that there was an alarm attatched to the inside, even though we knew there was. Surprisingly, the door opened from the outside with nary a whisper from the alarm. So much for dramatics. The various forms of refreshment made their way upstairs via some handy stairs which were right across from the manager's office. The hotel did have ice machines on each floor, but we had to empty every machine between the 4th and 11th floors to get enough ice to fill Tim Kress's bathtub. Steve and Tullio collected some money and got about 50 pounds of dry ice. I suggested they throw it all into the swimming pool, but they decided instead to put some of it in drinks, some in the sink, and a big chunk of it in the toilet. Many folks coming to the party were greeted by the GT Bubbling Toilet. (Much to the consternation of some femfans. Only some, I should say. A brave few took their chances, and none froze to the seat.--Ed.) We had a GT business meeting, and I made a plea, which I am repeating here, for stuff for the Compleat Techie. I can't be an editor if I don't get anything to edit! (Ayyyyyyyyy-men!--Ed.) Send me schematics, techniques, etc. Please!

Cosmo Klein showed up, bringing Jeff in tow, it seemed. The little microprocessor controlled monstrosity would do whatever Jeff pre-programmed him to do--er, well, most of the time. His favorite routine was to raise his arm up, down, up again (assuming that the gears held) and then charge forward regardless of what was in the way. I understand he knocked over the lamp in the room, and had similar collissions with pharmacists, wookies, and bellboys.

We shared the hotel with a pharmacists and Mobil Oil convention. (Not to mention the Knights of Columbus--but then again, better not to mention the Knights of Columbus--Ed.) We rarely saw them, which sin't surprising, considering the number of energy weapons around.

Joe--symbol of GT--marvelous incorporation of techie skills-- though he still doesn't hand out beers--was also there, wheeling around corners and scaring mundanes. Once again, he made the biggest hit in the hotel disco. The disco was live and on the air, and the DJ went nutz when he saw Joe roll in, followed by C-3p0, Darth Vader, and a dozen other characters from Warz. Joe broke a wire on his right side motor, so I got my techie kit and repaired him in the disco, after which it was decided to take him out. The bouncer gave me a strange look when I charged in carrying a fishing tackle box.

I heard a lot of people labelling Logan's Run as totally worthless sciffy while at the con. Maybe, but I still enjoy parts of the show every week. REM has got to be a direct descendent of Joe, with his attitude. I've also been noticing things that are starting to make me wonder if possibly there is someone intellegent that they have locked away somewhere, but whose ideas are filtering through. A) REM's leg is full of fiber-op. Why? Because someone said it "looks pretty," or because someone is thinking that wires are too narrow bandwidth to be used for data transmission but light pipes aren't? B) The guns have fire coming out of the muzzles (never mind the damned freeze ray) and there is no visible beam. A gas dynamic infrared laser? C) REM's tuning fork. Copies from Fantastic Journey, or thoughts on the Unified Field Theory? Of course, there is the hovercraft with the 120000% efficient solar cells which lifts off the ground on the beam of a pocket flashlight, etc. I think my main gripes was the idiotfen who were telling me that the show was worthless, way back in May, before it had even premiered. Prejudgement doesn't seem to me to fit into SF fandom, but many people were doing it before they saw the show, based on what the movie was. Let's learn to analyze before we jump to conclusions. We could always discuss the TouchTone controlled submarine on the Man from Atlantis, but I think I had better get this in the mail, so we shall see you next time.

BILL HIGGINS

was born 12 January 1954 on the banks of the picturesque Genesee River. I can't remember when I wasn't fascinated by machines. This interest in engineering works led naturally to a strong interest in science, and by age seven I had a strong hunch that I was going to be a physicist.

I didn't discover SF accidentally; I knew it was out there somewhere. Locating it in Detroit around third grade, I started a reading blitz which I have not yet stopped. One of my secret ambitions is someday to be a critic of SF. There are damned few folks around who have read 5 Olaf Stapledon novels.

I spent four excellent years at the University of Notre Dame, where I tried a little of everything: Radio Announcing, theology, snow sculpture (a giant bare foot with five toes, so we could look out the window and yell, "Hey, there's a foot of snow on the ground!"), high vacuum plumbing, square dancing, outdoor waffle making, information theory, 50 mile bicycle trips, history of science, building a small TV studio, kissing, tensors, running a coffeehouse, candlemaking...physics was picked as a major because a guy who wants to know everything has to start somewhere, and physics seems to be useful in understanding more things than any other major, except perhaps philosophy.

Of course I've been an unreconstructed techie from the start. Many of my identity problems have come from measuring myself against Tom Swift, Jr. One high point in my career was meeting Werner Von Braun and discussing with him the early days of the Verein fur Raumschiffahrt. I helped start TALOS (The Ardent Lovers of Science Fiction), an ND fan group which met desultorily for a couple of years, then folded when half its members left to form an SCA chapter.

My chief claim to fame in techiedom is model building, mostly planes, armor, and dioramas using them. Starting at 13, I bypassed many of the difficult stages younger modelers go through--zum Beispiel, I never set a battleship on fire nor demolished a tank with an M80. From the scrap box I have fashioned many spacecraft, death rays, ornithopters, and other unlikely items. (Hopefully your editor will be able to run a photo or two of them.) (He certainly will as soon as their creator sends a photo or two along.--Ed.) I thought these might turn a profit at cons; alas, only one has been bid on, let alone sold. Anybody wanna buy some models?

A former president of TALOS and the Physics Club of Notre Dame, I am a charter Zoid and a member of the American Physical Society and the Father Zorin Lunch Club. (No mean robot builders themselves.) I am a fair cartoonist, ukelele player, quantum mechanic ("I gotta change the plugs, points, and quarks on this baryon, Lady; you can pick it up the middle of next week...) Tandem Operator (That's a tandem Van De Graaf nuclear accelerator, gang) and volleyball player. Currently I am learning to play the banjo, talk to PDP's and micros, jitterbug, and paint lead miniatures.

I've spent a year now at Michigan State University, in pursuit of a Master's and maybe a Phd. in physics. Here I met Renee Seiber, official GT Shiggy, and the amazing Barry Gehm, the Egg of the Phoenix--just ask him an SF trivia question. Grad school is not as lively as ND was, but I'm getting used to it.

One last list to help characterize myself--I like: Clarke, Heinlein, Niven, Zelazny, Delany, Girls Who Smile, airplanes, strawberries, good special effects, other people's weddings, the Grateful Dead, puns, anchovies, acting, astrophysics, zepplins, Gravity's Rainbow, Notre Dame, coffeehouses, cranberry juice, videotape, T.S. Eliot, Singin' in the Rain, and Firesign Theatre.

* * *

TT CODE NUMBERS

Because the possibility of Techie Talkies has risen from the dead, we decided at Windycon to hand out call code numbers. The method we used was simply to have everyone pick a two digit number that appealed to them, starting with the most senior members down to the newcomers. Permissable codes are any number from 10 to 98, except for any double-digit combination. (55, 66, 77, etc.) Numbers from 01 to 09 and all use of the # and * keys will be for future control purposes and the "general call" (breaks all squelch) code.

So here's the list. Pick your number and send it in. If two people happen to send me the same number, the senior member gets it, and I'll break the news to junior. Then, pick again. Eventually you'll get one. Even if you never expect to have a TT, pick a number. We may use them for other things.

Jeff Duntemann	17
Steve Reubart	75
Frank Stodolka	63
John Stanley	31
Jim Fuerstenberg	80
Kurt Sakaeda	12
Martha Soukup	14
Al Duester	25
Todd Johnson	50
Clyde Jones	69
Mark Hyde	81
Alice Insley	98
Bill Higgins	76
Marco Mendez	48
Bill Colsher	93
Mike Bentley	86
Alex Ellingsen	21
Renee Sieber	13
Doug Price	54
Tim Kress	58
Jonathan Babbin	23
Ethan Lavan	20

* * *

LUKE BULLSEYES T-16's
FROM HIS WHOMP-RAT

GT ROBOT REPORT

Joe's success has spawned a whirlwind of robot activity within GT's sphere of influence. Steve and Tullio condensed Joe's makeshift klugeworks onto a single board, and built two more quickie Joe-class robots for sale to promoters on the east and west coasts. The net income may seem impressive, but considering the work that went into it, there may well be easier ways to make a living. These droids were different from Joe in that they used a PROM lookup table for the various commands; this simplified command decoding greatly. Aside from that, ensconsed in their shiny, brand new Lawson Torpedoes, they looked and acted a good deal like Joe. Steve and Tullio are taking a break from robot making for the time being. I don't blame them.

From Tolliver--"'Droid cosmetics? A weird term, but applicable. At least, if you're trying to make something look like what it ain't. A Lawson Torpedo, maybe?

"Okay, try this idea: Radio Shaft had a parabolic reflector set up as a cancer-stick lighter. It was aluminum, quite light in weight, shiny, and readily handled. The kicker? Rig it up as a dummy radar scanner, rotated by a geared-down, low-voltage DC motor. A pair of these (one horizontal, one vertical) would give an interesting touch to a droid a la Robby the Robot's two head units. See sketch:

"Now, then, to skirt the issue...

"Put a flexible vinyl skirt, hopefully opaque black, along the outer edges of the droid's base. This will cover his drive mechanisms and preclude a spy's curiosity. (Since of course no decent, God-fearing spy would stoop so low as to look under a robot's skirt!--Ed.)

"My droid? HARVIE, muddlin' through, barely. A friend gave me the upper half of a L'eggs nylons display module; in effect, half a five foot egg. It's radio transparent and extraordinarily light. These two factos will help considerably. I can mount the radio antenna internally and stop the public from screwing that up. (I gave up on IR control.) The light (3 lb.) weight will cut down on battery drain from dead weight dragged around by the poor motors.

"The name? Oh, yeah. HARVIE: Half Assed Robot Viewed as an Intellegent Enterprise."

Jeff has been stalled on the HARVIE project by Herbach & Rademan's running out of motorized casters. We dug around and found an alternate source:

C & H Sales Co.
2176 E. Colorado Boulevard
Pasadena CA 91107

Apparently C & H sells them for $9.95 apiece, with no price break on a pair. That's still cheaper than H & R, tho, so if you want them, get them quick before they run out too.

John Stanley announced at SunCon that he was beginning work on a robot named Dan. Dan takes his name from his outer casing, which is made up of two very large wholesale olive shipping jugs, made of sturdy translucent white plastic by the Dan company. Dan Co. has obligingly embossed their corporate logo prominently on the jugs, so it's a natural. Dan will be rather tall and slender, and I hope to hell John can solve the problem of droids' flying leaps onto their backs while executing quick changes in motion. Neither Joe nor Cosmo have thus far proven totally immune to such spills.

And, finally, Cosmo Klein, soon to be Klein no longer. Cosmo made his debut at Windycon, and although he was nowhere's near finished, he made an impressive showing as GT's first third-generation robot. (Second gen were the PROM controlled numbers Steve and Tullio sold not long ago.)

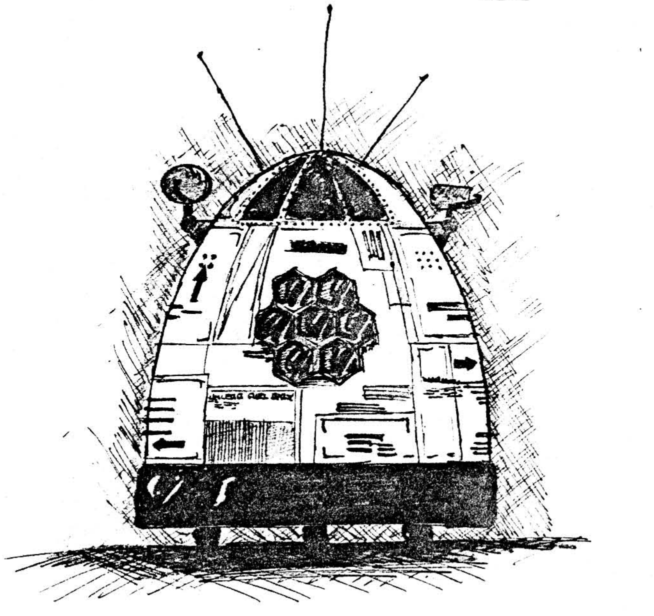
Cosmo uses the RCA 1802 microprocessor family. It's all CMOS, and virtually all the power used by the logic went to the LED display units (TIL311 hex jobs) and the TTL driver circuitry. The high noise immunity of CMOS protected the processor beautifully from any noise produced by the DC motors and relays. In fact, it was the clock frequency of the processor which leaked into the phase-locked loop tone decoders and rendered them ineffective for remote controlling. Cosmo was thus not radio-controlled as Joe is--yet. He will be, soon.

Cosmo was built in two halves, so that he can be broken down for easier shipment in my less-than-luxury sized Honda Civic. Unfortunately, I had not yet installed the plug between the top and bottom halves, so Cosmo went to the con in the front seat of my sister's car, and tore up her ceiling on the way in. I also broke off his ignition key in the lock, and was forced to make another the hard way, but that story another time. Two switches on the end of a cable moved Cosmo around to wherever I wanted to run him, but after that the processor took over.

Cosmo's four motors and four relays are controlled neatly by an eight-bit word stored in memory. A simple program popped a command off a stack of commands, outputted it to the motors through a CMOS-TTL interface port, and then idled through a timing loop for about a second. When the loop was finished, he popped the next command off the stack, executed it, and so on. Since all four motors and all four relays are independently controllable, any combination of motions is possible with the right command.

Cosmo has two Joe-type motors, reversible by relays. He has a motor to raise and lower a yet-unfinished arm. A fourth motor rotates his entire upper structure. The motions can be combined by combining bits in the command byte. Once a command sequence is loaded, the processor is started and Cosmo becomes his own man. It was eerie as hell to see the thing raising and lowering its arm, turning back and forth as though searching, and then taking off in some random direction like a bat out of hell.

MORE



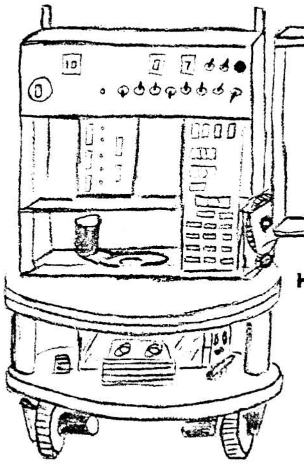
NEXT STOP:
17TH FLOOR!

HARVIE

I learned a lot about Cosmo and robots in general by this initial field test. One thing is that Cosmo's original concept, that of a "visible" robot (one which has no overall shell covering everything) is not a terribly good idea. People kept telling me to put some clothes on him. (I told one chesty female that I would gladly oblige if she would give me hers.) Cosmo was Cosmo Klein for that reason, as a Klein bottle's insides are the same as its outsides. So it was to be with Cosmo. But now, I think it may be otherwise. I have a quantity of black plexiglass and a good deal of sheet aluminum, and once I get back from my little field trip I may dress him up a little.

I also realized that Cosmo will need a lot more memory than the CPU board can hold, and that the CPU board is also poorly designed and short of I/O lines through the connector. I decided, then, to completely redesign the COSMAC processor and put the whole shebang, with about 3K of memory, on a single Vector 80 pin board. It's also something to do with the long nights in Virginia.

Next issue we'll continue the robot status report with bits and pieces of whatever robots are making the news. Are you starting a robot? Let me know all about it. GT is on the program of Igunancon, with a lecture I'll be giving, entitled, "Building the Poor Man's Robot. Will you be there? Will you have a mechanical companion along? Why not?


COSMO KLEIN

AS OF 10/7/77

TECHNIC

We see the word "technic" used by itself very seldom these days. It's pronounced just like "technique," and means much the same thing, save that these days "technique" is more likely to be taken to mean "style" instead of "procedure." Hobby-type magazines from the early part of the century used it a lot, as in an article describing an optical figuring technic, or some chemical technic. It's a good word, and I'd like to see it come back into style--notwithstanding the fact that it's in our name. We could call this a semiregular column, and if any of you out there know of an unusual tool or novel procedure of value to techies, write it up as a "Technics" column. I'd much appreciate it.

One age-old hassle with copper PC boards is that they tarnish in time, and get both ugly and difficult to solder to. Professional boards are tin-plated, and retain a good soldering surface forever, besides looking sharp and finished. I finally ran across a hobbyist tinplating solution at a hamfest.

The two little envelopes of tin salts cost five bucks, and they make a quart of solution. That does a lot of boards, with the only drawback that the stuff oxidizes and loses its guts after awhile, and has a shelf life of only about a year. Whether it's worth the money depends on you. This rich boy thinks it is.

Preparing it is simple: you measure out a quart of warm water (temp not critical) and dump the two envelopes worth of salts into the water. Mix it with a stick, crunching all the lumps until nothing wants to dissolve anymore. At that point you dump your board in, and let it sit for ten minutes. Watching the shiny copper turn silver in a matter of seconds is a trip, but let it build up a decent coat. Your board, I should add, must be scrupulously clean. Scrub that muther with a Brillo pad until every last corner shines; then rinse it good and rub it down with a cotton wad dipped in alchohol. Keep yer greasy fingers off the copper, or your tin coating will rub right off. It's also a good idea to keep your fingers out of the solution--some people are allergic to heavy-metal salts.

I'm itching to try electroplating with the solution, and I will as soon as I can locate a little piece of reasonably pure tin metal for an electrode. Electroplating usually makes for a better coat than immersion plating, though electroplating an etched circuit board would be difficult. Somebody tell me if tin is attacked by ferric chloride; if it is you could electroplate some raw board, lay out a pattern and then etch both copper and tin away. (Tom Andrews--you're our resident chemist--what's your professional opinion?)

The same chap who sold me the tin plate sold me four little solid-carbide drill bits: #65, 69, and 75. (Two #65) I had never seen carbide bits that small before, and bit on it immediately. I drill circuit boards with a Dremel Moto-Tool, and at that speed conventional bits overheat and lose their temper quickly. Carbide bits will not get dull drilling copper-glass boards forever, but dulling is hardly the most important problem.

Figure this: I broke three of those four bits within the first ten minutes of drilling.

Carbide is harder than hell, but brittle, far more brittle than the worst needle file, and the tiniest bit of side-side pressure will snap off a #65 bit. The bits he sold me were from professional PC board drilling machines, accurate to a few ten thousandths of an inch. I claim to have a pretty steady hand, but those bits give you little room for mistakes; one little twitch, and good bye bit. I'm hoarding the last bit pending acquisition of a Dremel drill press stand for the Moto-Tool. Unless you have something similar, don't put money into carbide bits. The human hand hasn't been made that won't crack them in an hour or so.

Another note on the Moto-Tool: Grinding wheels which part company from their arbors at 50,000 RPM are a little like objects dropped at Mesklin's poles. You don't see them go; they simply disappear. Wherever they reappear, however, they will be moving at a nasty clip, so put something over your eyes when Dremelling.

In case you're interested in either the tinplating solution (superb) or the carbide bits (risky) write to Excel Circuits, 4412 Fernlee, Royal Oak Michigan, 48073. They also sell a complete PC board process which is probably the best I've ever seen. They use positive presensitized boards which develop in a water solution instead of hydrocarbon solvent, and the resist turns purple when it's developed. The boards can be handled in room light and are exposed under a normal photoflood. If I didn't have fifteen bucks wrapped up in 3M INT materials I'd probably have bought the process. Check it out. {

FROM TOLLIVER--Can the Xerox 9200 copy onto clear or matte sheet plastic? Accurately, that is: 100%? 50% 25% Seems that if it can, you could do a master copy of a PC layout and make an opaque image transparency using the 9200. This could eliminate a few hassles with photo labs.

(I wish it could, Jeff; I wish it could. The idea hit me when Xerox first announced the 9200, but sorry to say it won't work. The objections apply in principle to all xerographic copiers. The most damning problem is one of size. A "full size" copy mode actually enlarges the copy by about 2%. This is to allow the mechanics of the scan and paper feed system a little bit of slop without putting a "border band" on the paper from minute variations in scan speed. Next time you make a copy on a Xerox Corp. machine, hold the copy over the original up to the light. The variation is insignificant over a small area, but it adds up, and could mean your IC pads wouldn't match your IC pins. The second problem is that xerographic processes develop solid black areas poorly compared to photo methods. The solid blacks in a PC layout would let enough light through to mess up the resist development. In the final analysis, nothing beats a well-made contact negative for PC work.)

FROM STODOLKA--...I find Mike O'Brien's "Forks and Daemons" especially informative. His observations of programming and programs make a lot of books seem dry by comparison. Keep it up! (You hear that, Mike?)

Car Wars? Aaaaaaaarrrrrgh!

The Duntemanns and Pyro moving? Well, I doubt that moving will force you to become completely dependent on the mails. If you make it to conventions and keep in touch via Carol's ham radio I think that will improve communications. Also, after having met the Dynamic Duo at SunCon I betcha wherever you two go you'll locate a bunch of techies. Then, as surely as tribbles proliferate, we'll have yet another GT group going to raise havoc. Why, in a few years we could produce our own regional cons!

Whoa, there, Stodolka, old boy; techies are a subculture of fandom which in turn is a subculture of its own. Right? Well, partially. I suppose we've got to include the others: ham radio and computer hobbyists. So the long range development of techie groups will depend on how many SF fans we can find among those groups who are turned on the way we are--not just on how many fans in regular SF fandom are also techies at heart.

To me, this means that techies can have more fun and (incidentally) sell more of our electronic goodies by going to the conventions both SF and non-SF, in groups. With the number of variables to be considered, i.e. keeping track of con schedules for ham radio buffs, SF fands, and computer hobbyists and ghu only knows what else, doing this as a group could get rather tricky. However, if ye editor and editrix (editress) are interested, perhaps we could start a regular feature listing the various types of cons, dates, points of interest and the names of drivers/riders who would like to go. I would be glad to provide info on the computer hobbyist conventions if such is needed. And, as most of you know, the Slan Van gets around quite a byte these days.

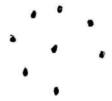
(We'll make a stab at the con data column, perhaps; I'll start collecting data from anyone who wants to send it. This will include hamfests, computer shows, whatever anybody thinks might be a techie-magment. Carol and I are both hams, by the way, though we share a transmitter. Unfortunately, the two of us comprise a full 40% of all the hams in GT, the others being George Ewing WA8WTE, Neil Preston, WB0DQW, and Mike O'Brien WB9MJV. That's a cozy group but it doesn't add up to universal communication. So this is as good a time as any to step up on the soapbox and preach at you people to go out and get radio techie licenses. The ignorance of this group in regards to RF practice is appalling! Just think of amateur television, teletype, satellite repeaters, meteor scatter, moonbounce, and all the other neat shit you can get into just by memorizing that dopey old Morse code! There is no longer a code sending test at all. The receiving test is a lot easier than it used to be, since you must merely copy for five minutes as loosely as you like and then take a ten question test on the contents of the message. Seven right wins it. It's a lot of fun, and it beats the pants off of CB. Why not give it a try?)

FROM STANLEY--Greetings Folks. This is a request for any and all ideas that can be used in a cartoon series I'm considering for Pyro to be known as "Star Tech;" outline, characters, inventions are all solicited. Let's all get together and make it something great....
(You might want to contact Bill Higgins. He's the only practicing cartoonist in GT that I know of, except for George Ewing when he gets frisky. Also Dave Corner. And perhaps Todd Johnson. I might even think of something myself.)

FROM FOX--I have available to me in mint condition an Army WWII period radio with the following ID plate:

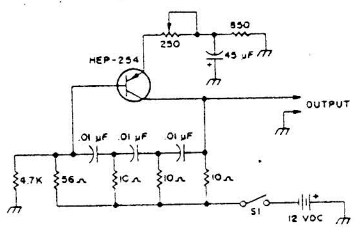
SIGNAL CORPS US ARMY
RADIO RECEIVER AND TRANSMITTER BC-654-A
SERIAL NO. 49977
MADE BY
THE CROSELY CORPORATION
CINCINNATI OHIO

If anyone out there can locate for me an Army technical manual for this radio and/or power supply and jack I would be very grateful. The approximate plug pin pattern is:



ODD BODKINS

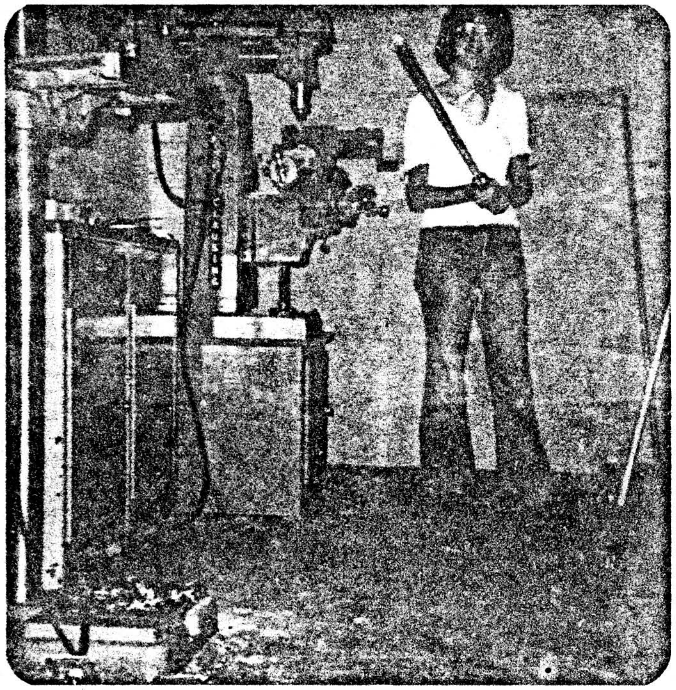
LIFTED FROM HERE & THERE



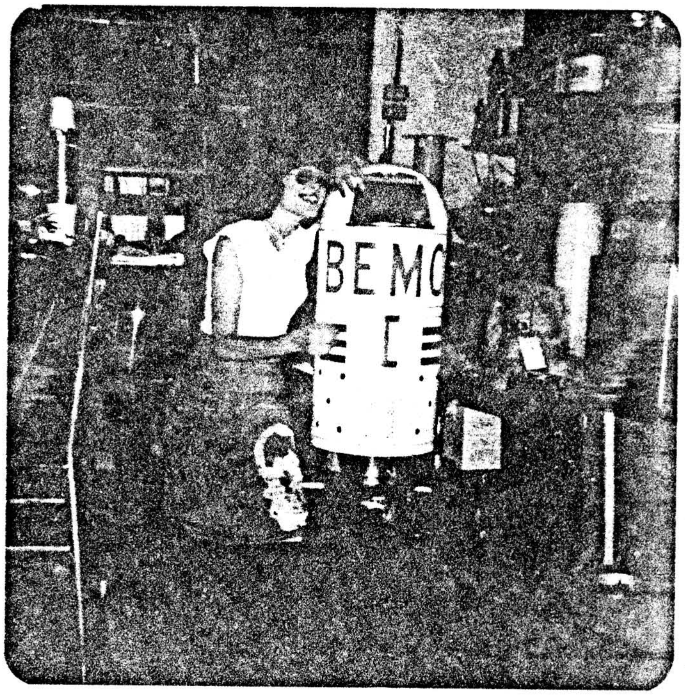
Q. Is there a way of designing an at oscillator so that it has an 800 Hz output?

A. Refer to the figure. The following transistors may be used in this oscillator: HEP-254, O.C.-2, SK-3004, AT30H. To increase the frequency, decrease the value of the capacitors in the ladder network.

PYRO
PICTURE PAGE



Renee lab-testing Proni light-saber. It was later taken to a saloon in bucktown for field testing, with promising results.



BEMO I and groupie. Notice how his antenna stands straight up.

GREAT BIG TIDE-YOU-OVER-UNTIL-NEXT-YEAR-ISSUE!!!!!

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